YSU GRIMs淺積雲參數法之評估

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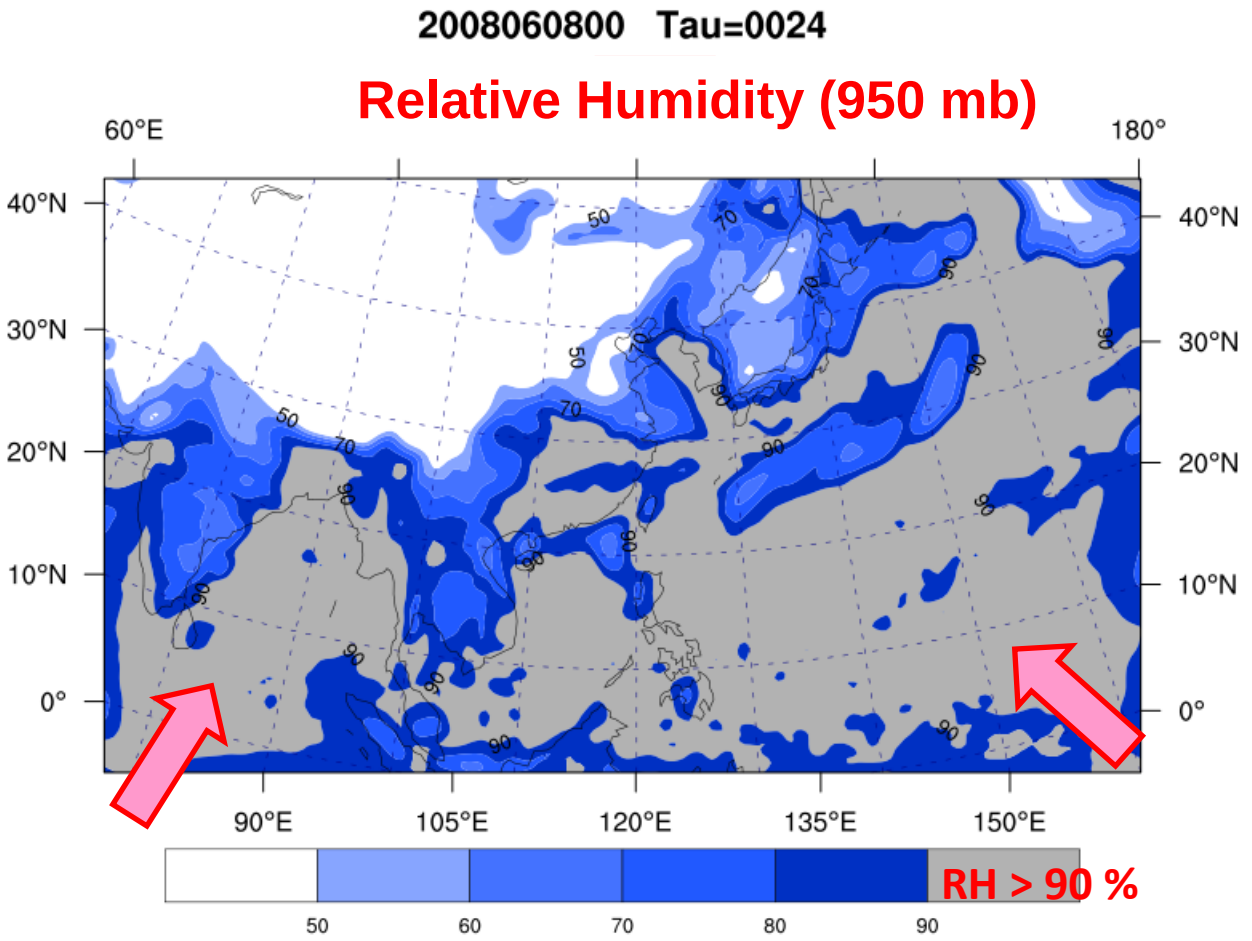
103 / 09 / 17

OUTLINE

- Motivation
- Introduction to the Shallow Convection
- Result

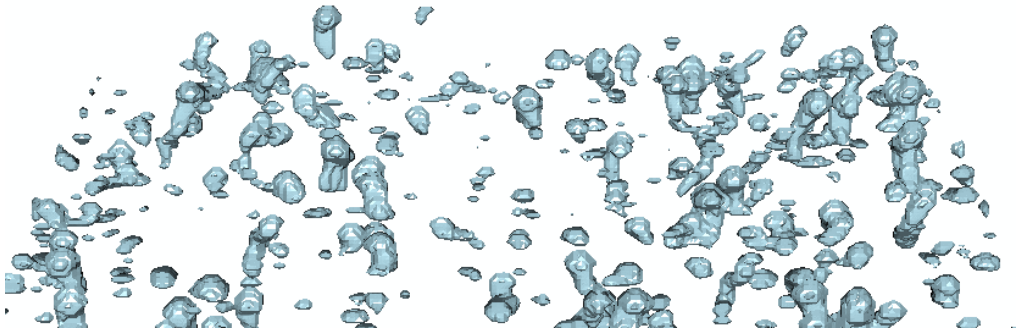
Motivation

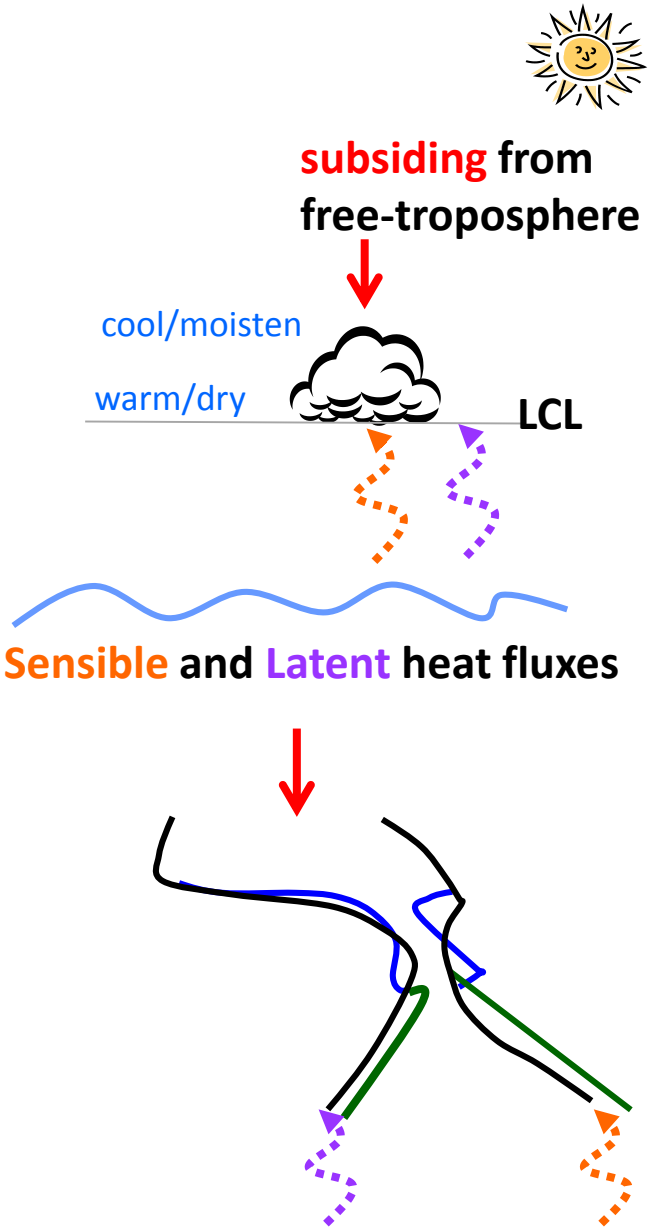


Too much moisture over ocean

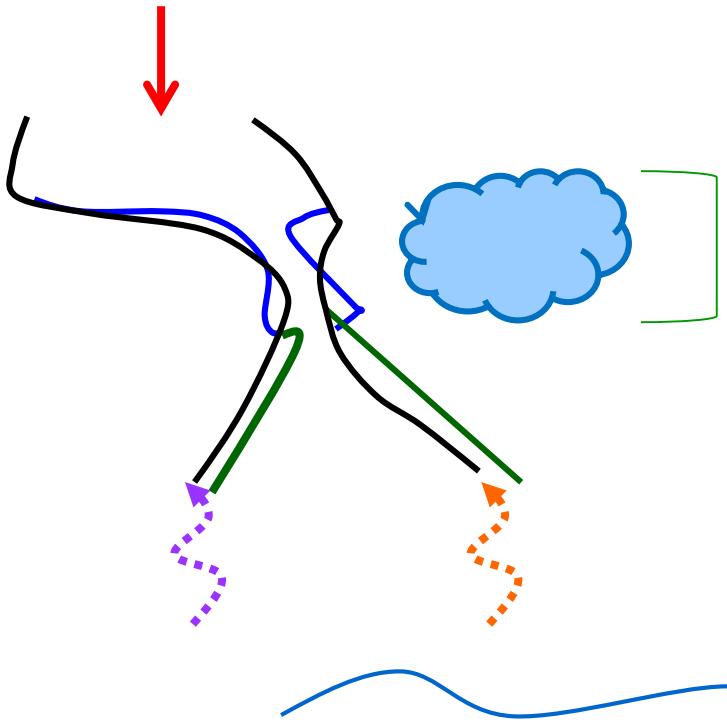
評估淺積雲參數化方法

- 是否能改善海洋邊界層的發展
- 是否能降低低層雲過多的現象




subsiding from
free-troposphere
cool/moisten
warm/dry
LCL
Sensible and Latent heat fluxes

YSU GRIMs淺積雲參數法



1.

Cloud top:

•Minimum moist static energy(below sigma .lt. 0.6)

Cloud bottom:

•PBL(check the parcel buoyancy)

2. Eddy diffusivity approach

$$\frac{\partial \overline{T}}{\partial t} = \frac{1}{\rho}\frac{\partial}{\partial z}\left[\overline{\rho}K\left(\frac{\partial \overline{T}}{\partial z} + \Gamma\right)\right]$$

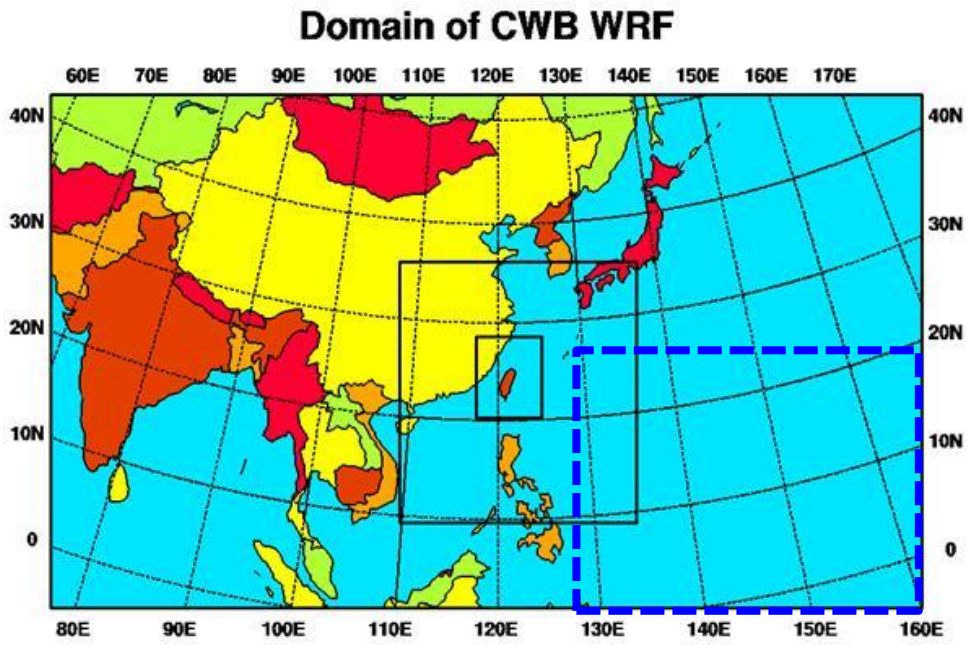
$$\frac{\partial \overline{q}}{\partial t} = \frac{1}{\rho}\frac{\partial}{\partial z}\left[\overline{\rho}K\frac{\partial \overline{q}}{\partial z}\right]$$

$$K = RH \times 1.47w \times \delta \times \left(1-(\frac{z}{h})^3\right)$$

Experiment and Conclusion ：

- Model setting
- **CTL** VS. **SHCU** (YSU Grims shallow scheme)
  - Date: 2008060800 @ fcst =24

Model setting

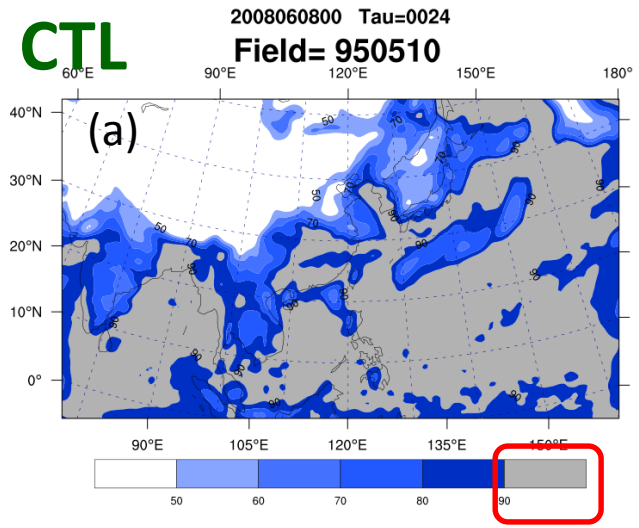


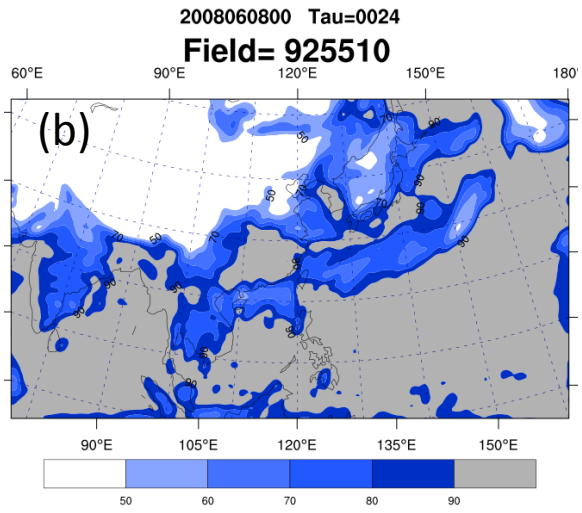
mp_physics	Goddard 5-class scheme
bl_pbl_physics	Yonsei University scheme
ra_lw_physics	RRTM scheme
ra_sw_physics	Goddard shortwave
sf_sfclay_physics	Monin-Obukhov scheme
sf_surface_physics	NOAH

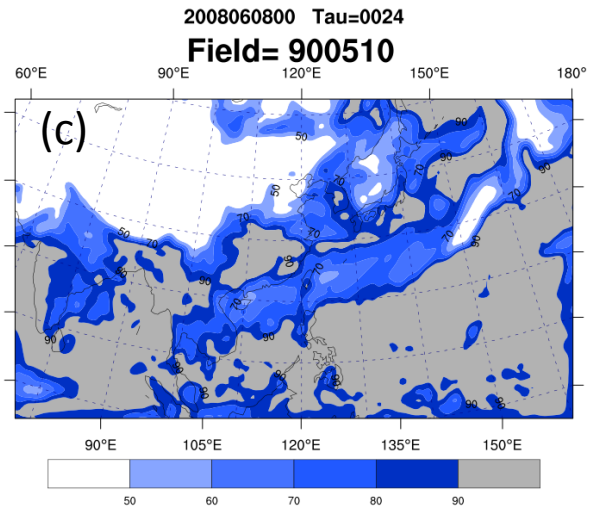
模式邊界條件	模式解析度	X方向格點數	Y方向格點數	垂直層數
NCEP GFS預報場	**45 KM**	**222**	**128**	**45層**

Low Level Relative Humidity

CTL

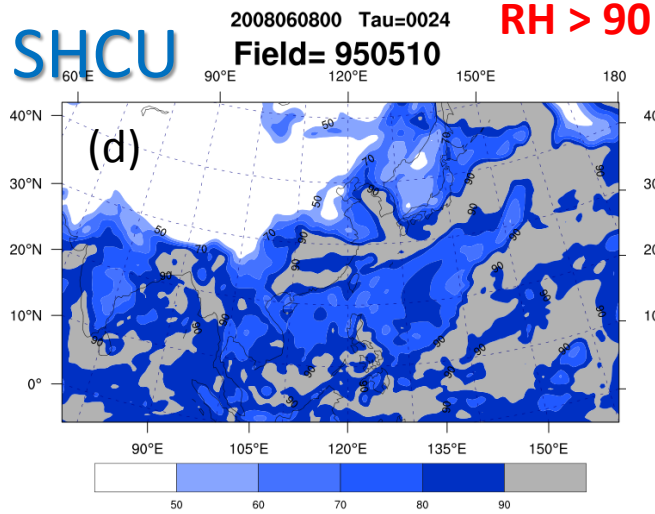


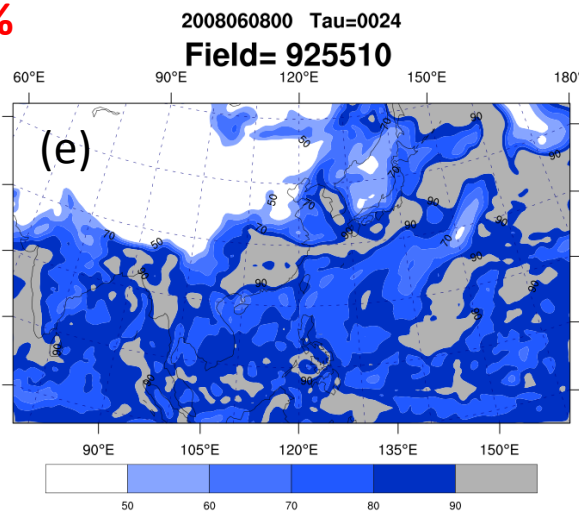


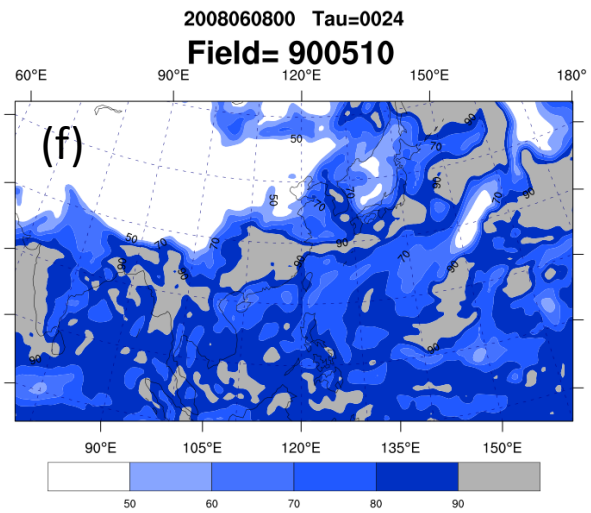


RH > 90 %

SHCU



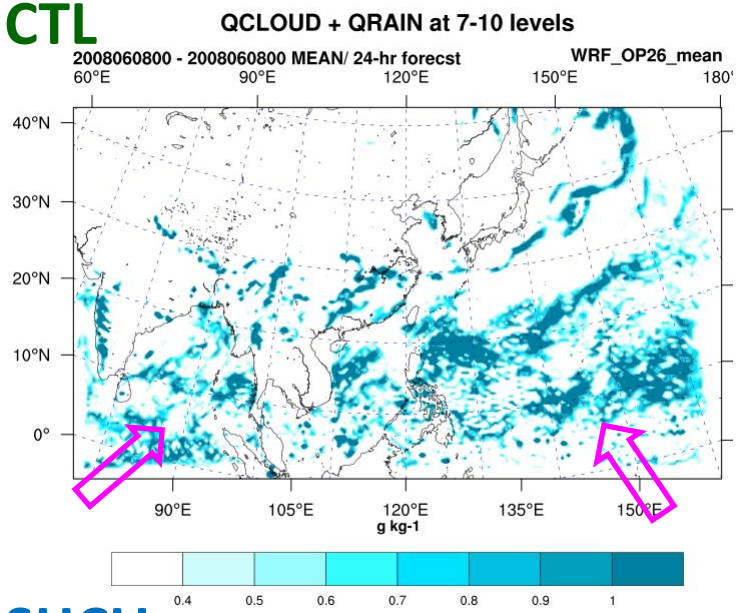




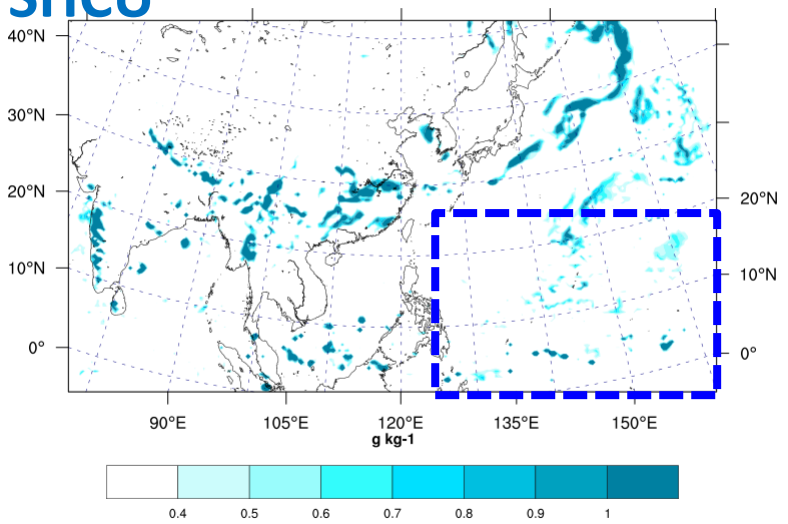
Influence on Low-Level Cloud

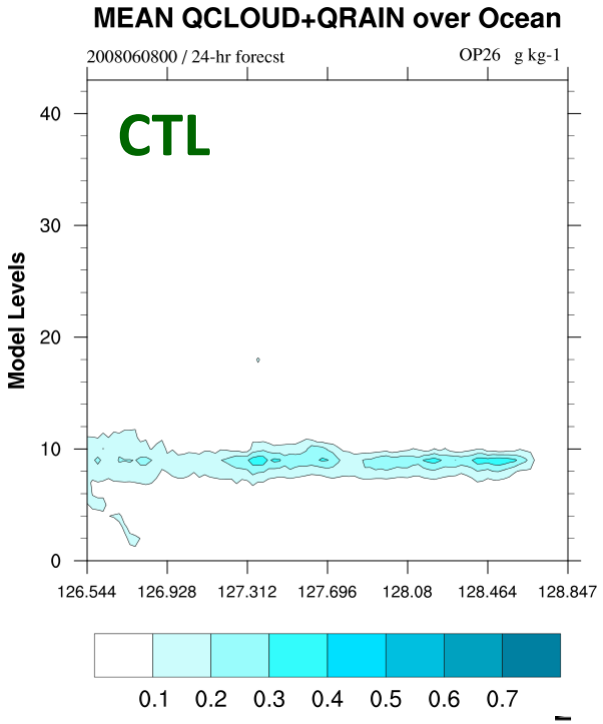
eta levels= 0.97 ~ 0.89 at hour 24

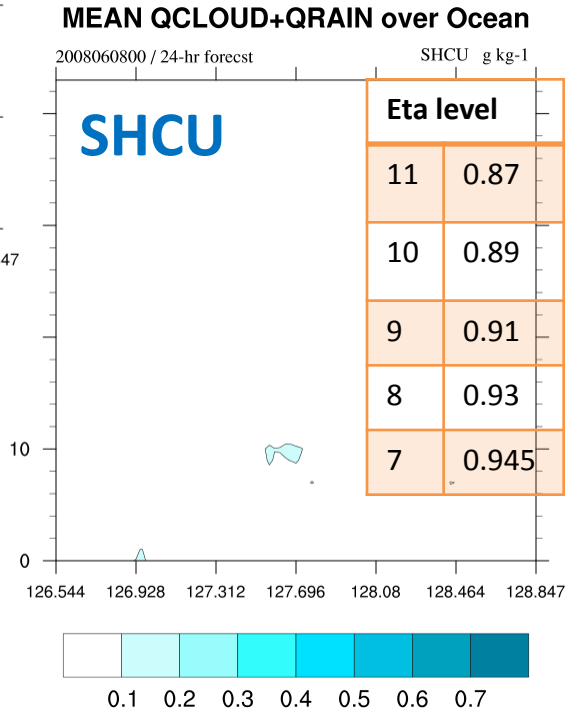
CTL



SHCU





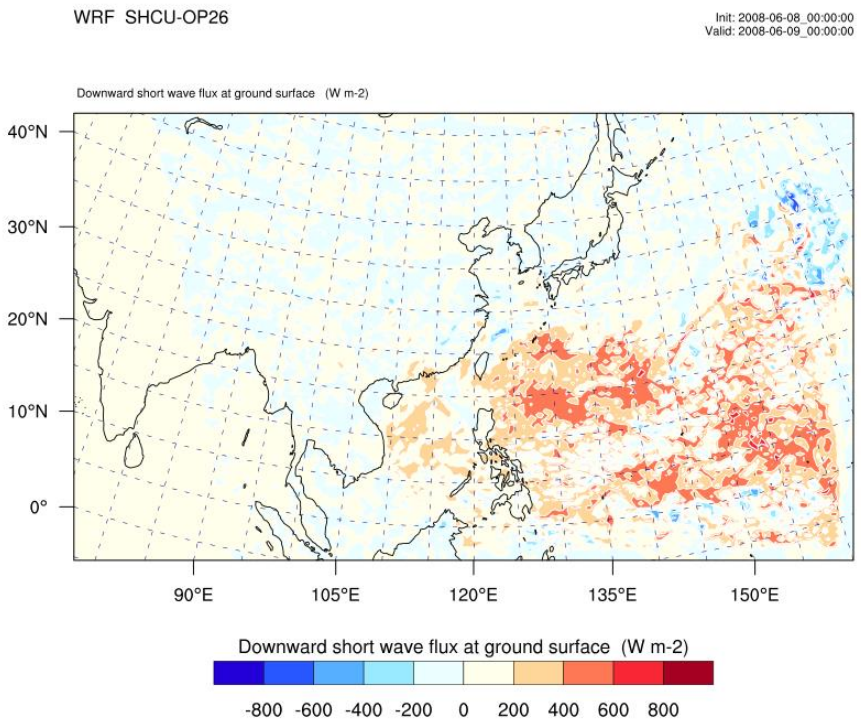


Change in Shortwave Radiation / Temperature at 2M /Latent Heat Flux

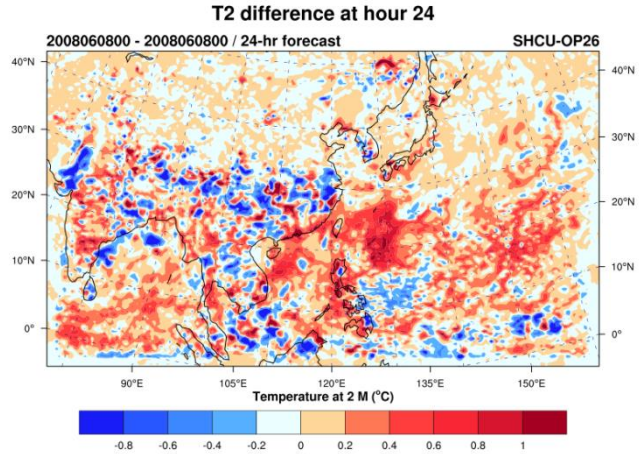
difference at hour 24

SHCU – CTL

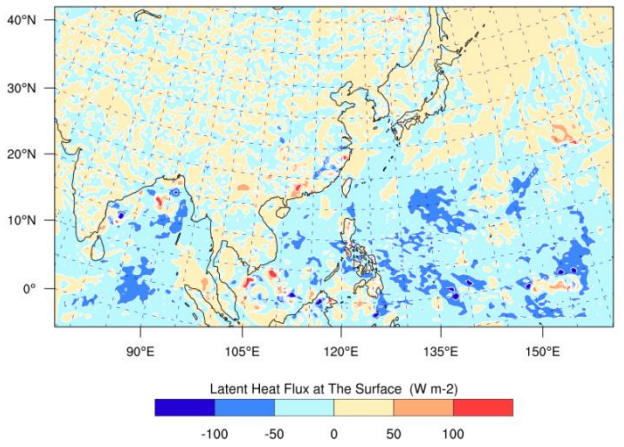
SWDOWN



T2

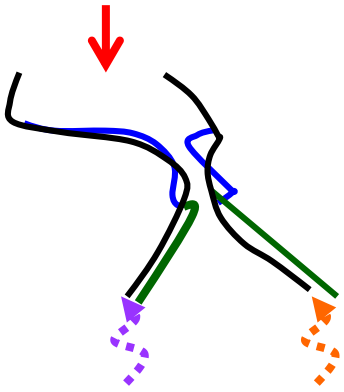


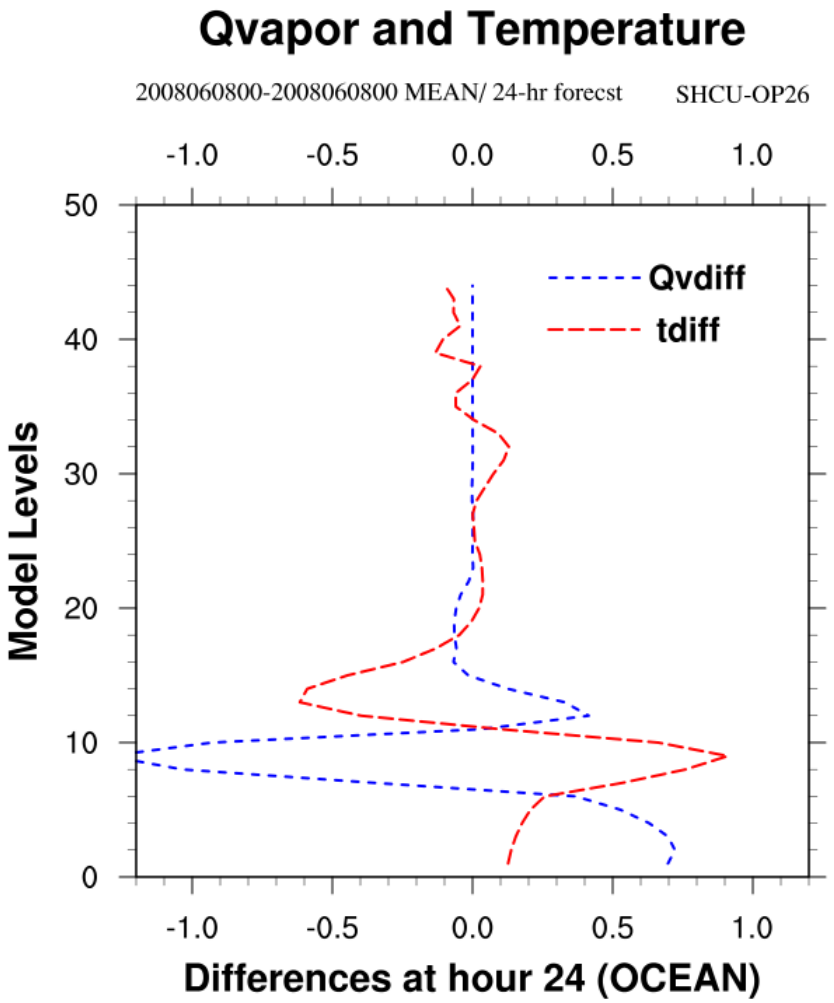
Latent heat flux



Temperature and Qv Change

difference at hour 24

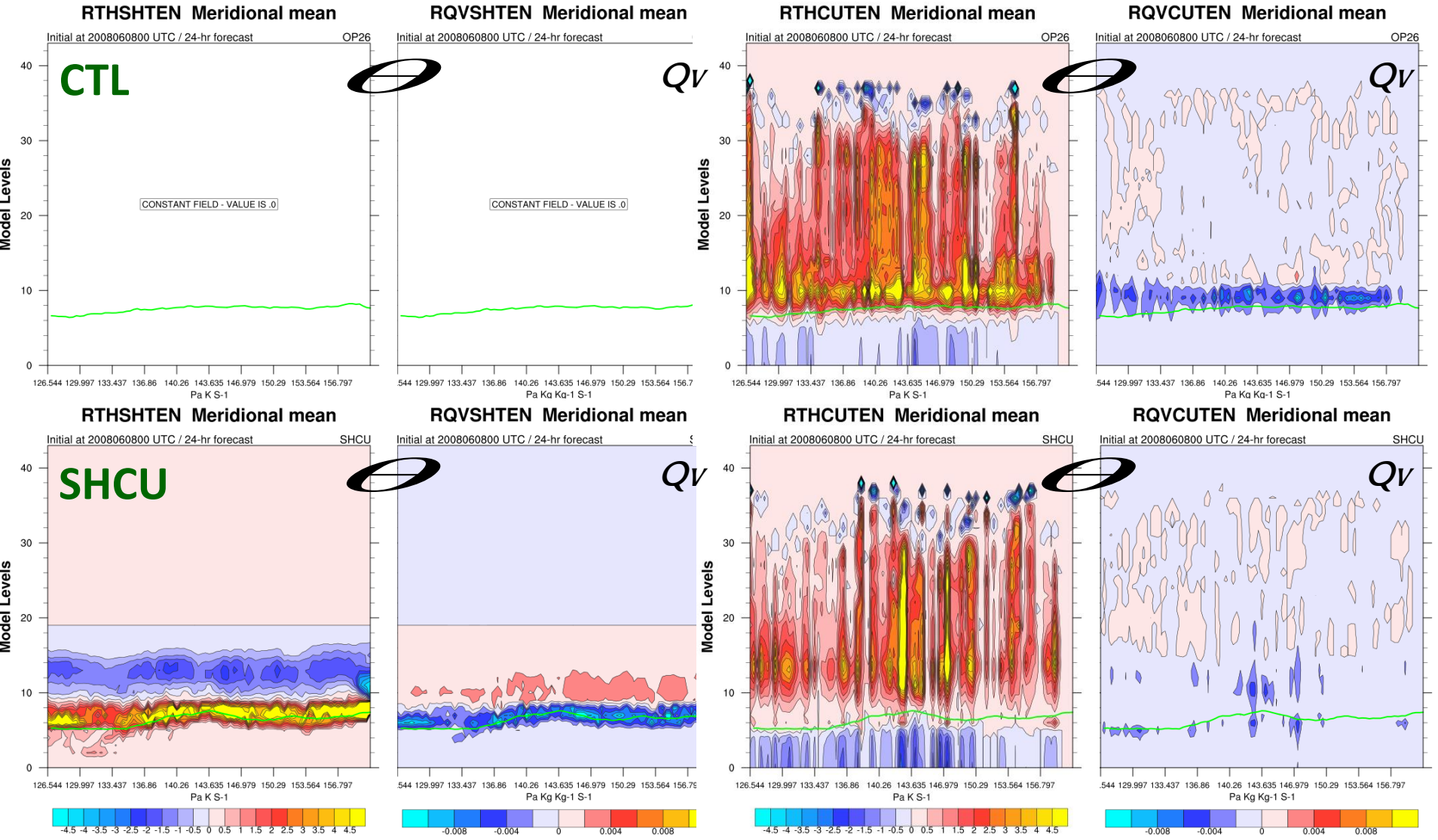




Budget analysis from the model physical process

Shallow Cumulus

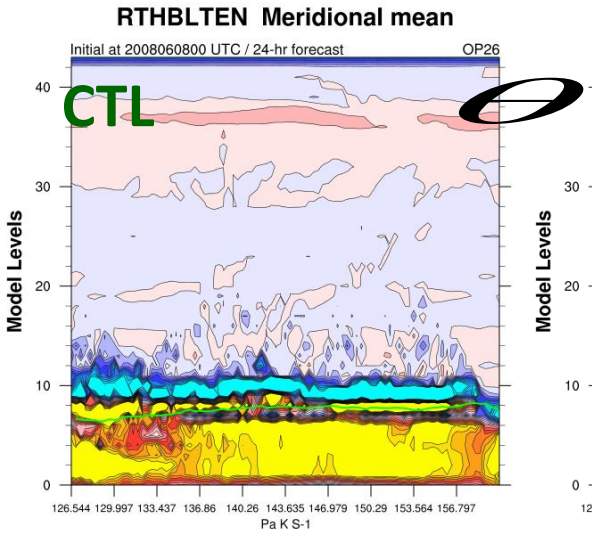
Cumulus scheme

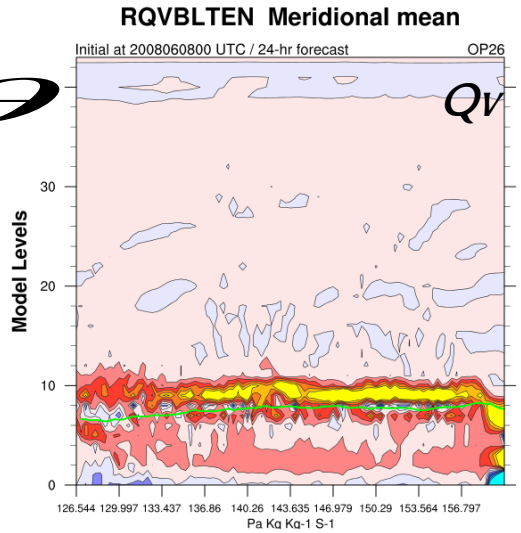


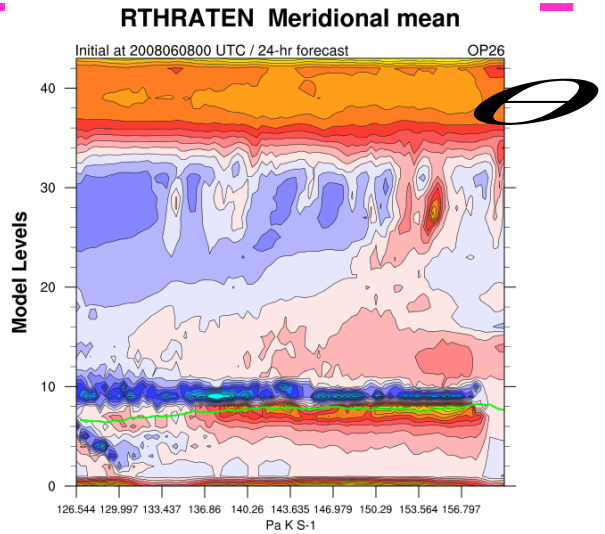
Budget analysis from the model physical process

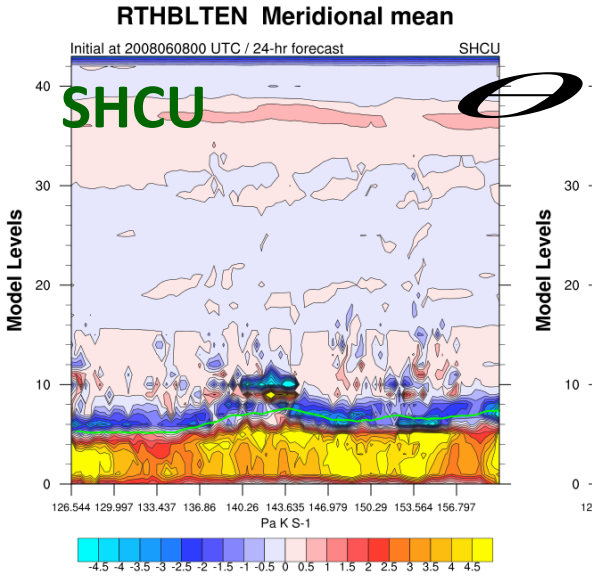
PBL Parameterization

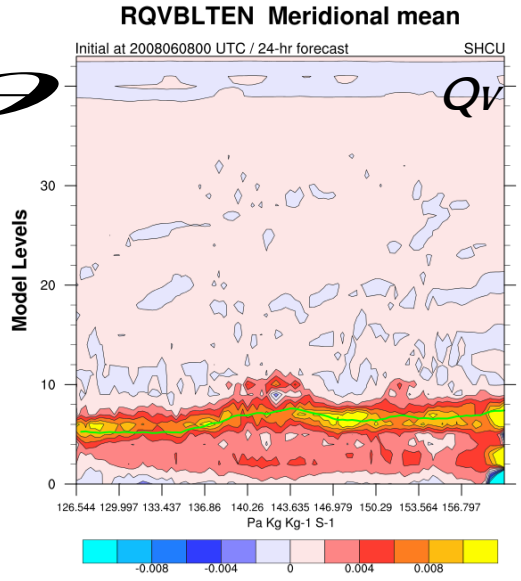
Radiation Parameterization

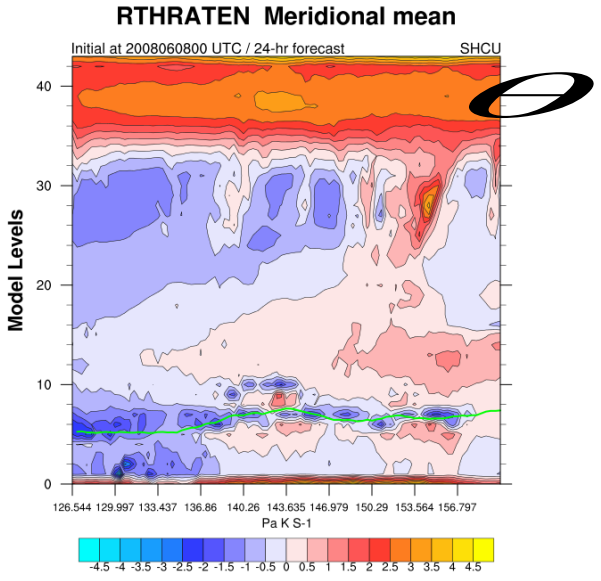






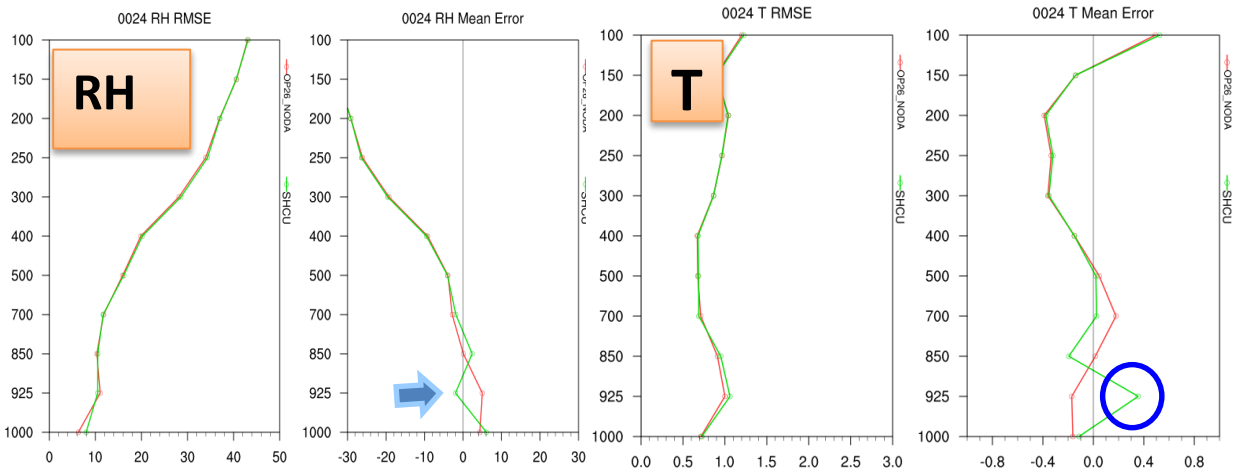






Conclusion

- YSU Grims 淺積雲參數化方法可以有效改善海洋邊界層層狀薄雲覆蓋現象



– 15日模式預報校驗結果發現邊界層溫度偏差變大

=> 調整淺積雲參數法中eddy diffusivity coefficient (K)

END